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**United States Patent** [19]

Sinha

[11] **Patent Number:** 5,886,262[45] **Date of Patent:** Mar. 23, 1999**[54] APPARATUS AND METHOD FOR  
COMPARING CORRESPONDING ACOUSTIC  
RESONANCES IN LIQUIDS**[75] Inventor: **Dipen N. Sinha**, Los Almos, N. Mex.[73] Assignee: **The Regents of The University of  
California**, Los Alamos, N. Mex.[21] Appl. No.: **218,102**[22] Filed: **Mar. 25, 1994**[51] **Int. Cl.<sup>6</sup>** ..... **G01N 29/12**[52] **U.S. Cl.** ..... **73/579; 73/592**[58] **Field of Search** ..... 73/579, 592, 620,  
73/627, 632, 645, 646, 648, 659**[56] References Cited****U.S. PATENT DOCUMENTS**

4,391,129	7/1983	Trinh et al.	73/579
4,771,792	9/1988	Seale	73/575
4,991,124	2/1991	Kline	73/579
5,062,296	11/1991	Migliori	73/579
5,259,250	11/1993	Kolpak	73/861.38
5,359,541	10/1994	Pope et al.	73/32 A
5,426,977	6/1995	Johnston et al.	73/579

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Apparatus and method for comparing corresponding acoustic resonances in liquids. The present invention permits the measurement of certain characteristics of liquids which affect the speed of sound therein. For example, a direct correlation between the octane rating of gasoline and the speed of sound in a gasoline sample has been experimentally observed. Therefore, changes in the speed of sound therein can be utilized as a sensitive parameter for determining changes in composition of a liquid sample. The present apparatus establishes interference patterns inside of a liquid without requiring the use of very thin, rigorously parallel ceramic discs, but rather uses readily available piezoelectric transducers attached to the outside surface of the usual container for the liquid and located on the same side thereof in the vicinity of one another. That is, various receptacle geometries may be employed, and the driving and receiving transducers may be located on the same side of the receptacle. The cell may also be constructed of any material that is inert to the liquid under investigation. A single-transducer embodiment, where the same transducer provides the excitation to the sample container and receives signals impressed therein, is also described.

**5 Claims, 5 Drawing Sheets**